1

2

3

$Zn+2H^{+}=Zn^{2+}+H_2\uparrow$

[illegible]

1. [illegible]

2. [illegible]

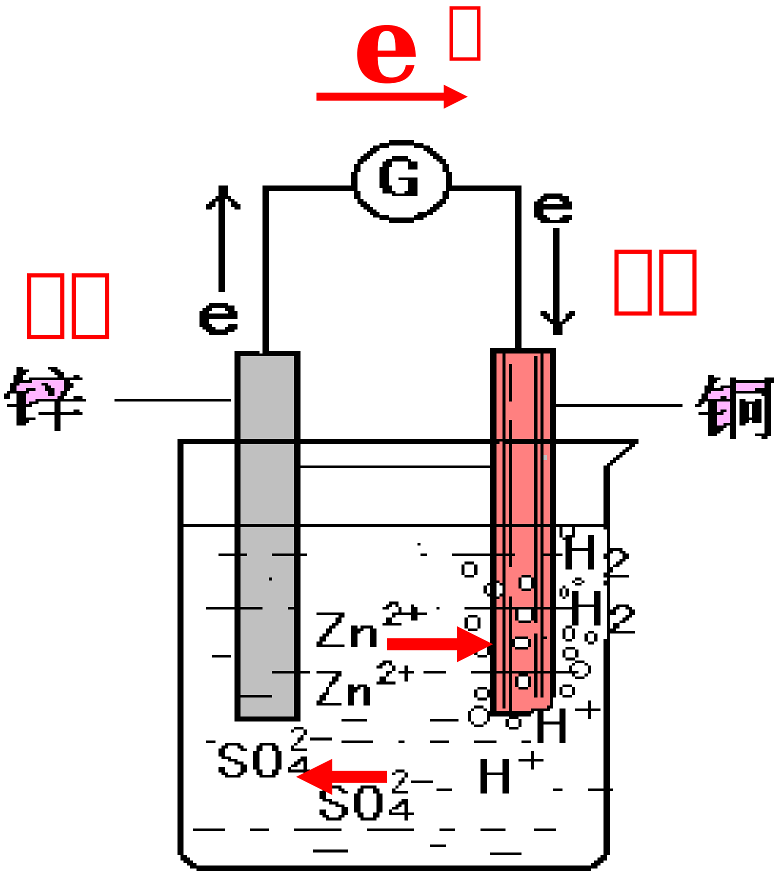
[illegible] [illegible]→[illegible]

[illegible]→[illegible]

[illegible]

[illegible]

[illegible]



[illegible] - [illegible] $- ne^- =$ [illegible]

[illegible] + [illegible] $+ ne^- =$ [illegible]

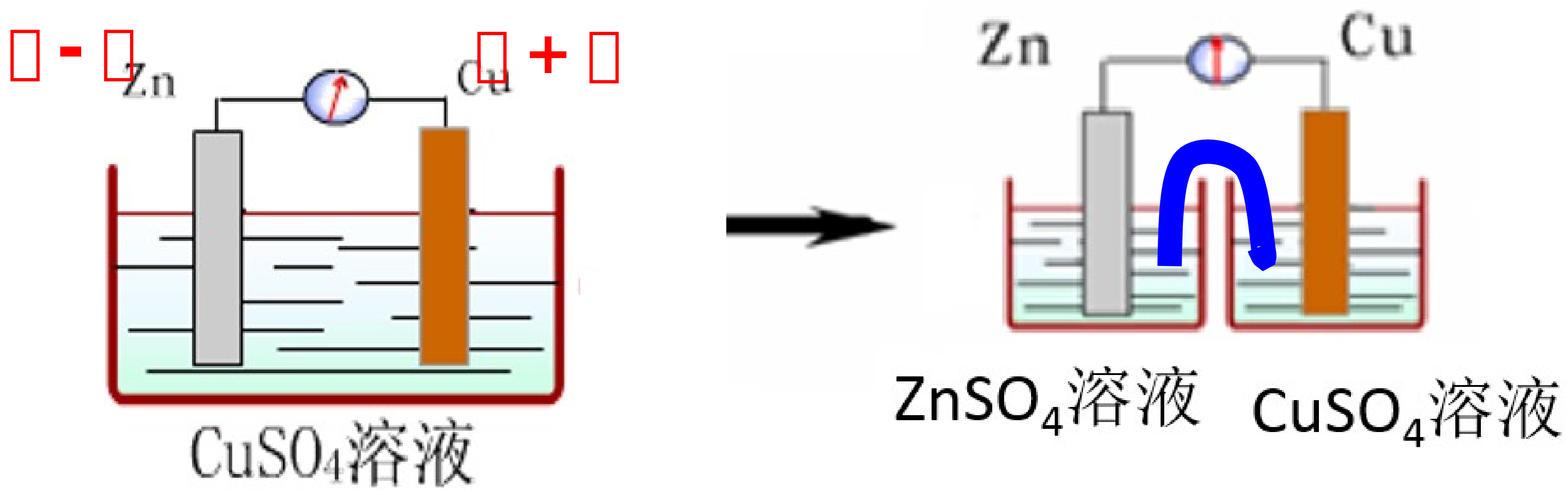
3

电极名称	负极	正极
电极材料	活泼性较强的金属	活泼性较弱的金属
电子流向	流出电子的一极	流入电子的一极
反应类型	发生氧化反应	发生还原反应
离子流向	阴离子移向的一极	阳离子移向的一极
实验现象	溶解的一极	增重或有气泡放出

□□□□□ $Zn + CuSO_4 = Cu + ZnSO_4$ □□□□□□

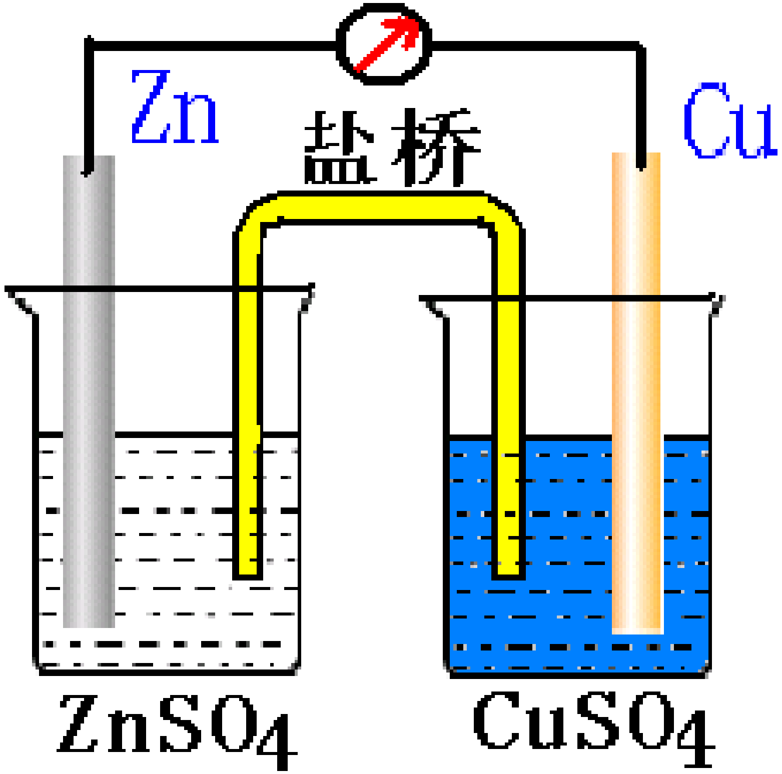
□□□ $Zn - 2e^- = Zn^{2+}$

□□ : $Cu^{2+} + 2e^- = Cu$



□□□□□□□□□□□□□□

[illegible]



1. [illegible]

[illegible] U [illegible] KCl [illegible]

[illegible]

[illegible]

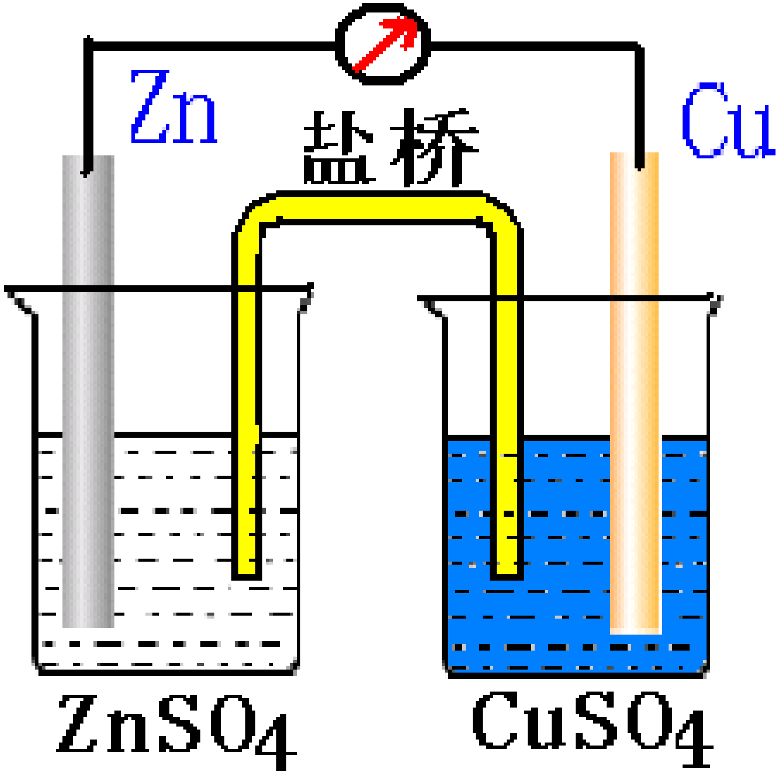
① [illegible]

② [illegible]

2. [illegible]

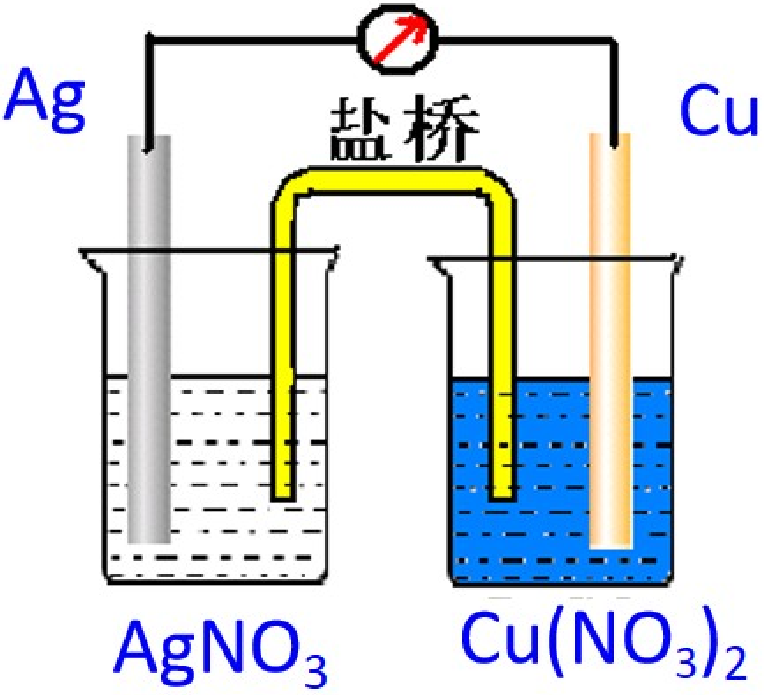
① [illegible]

② [illegible]



[illegible]

[illegible]

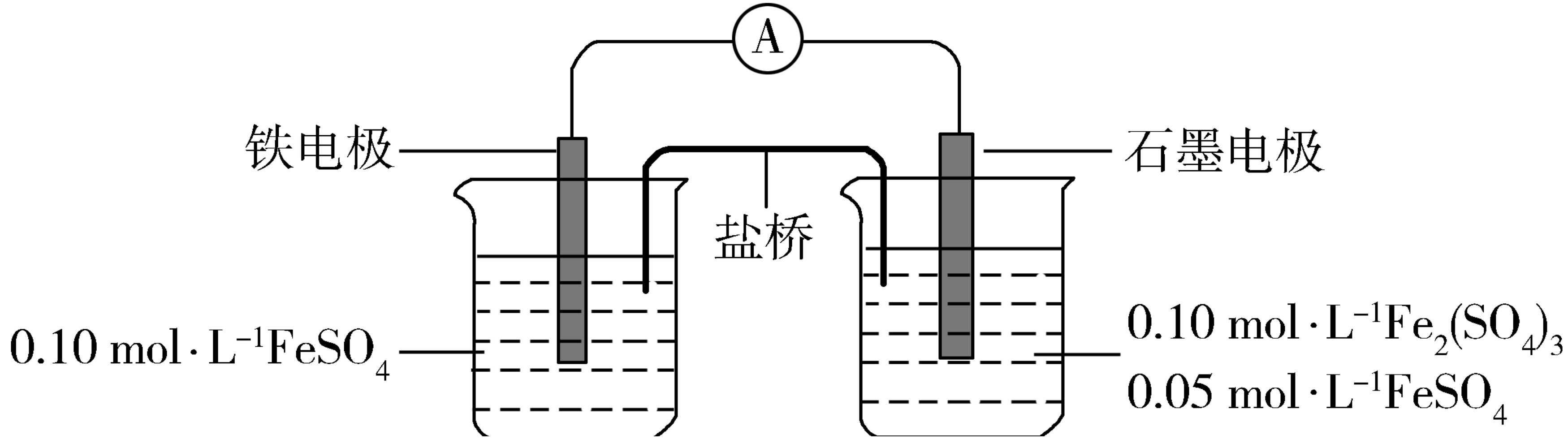


[illegible] KCl [illegible] KNO_3 [illegible]

KNO_3 [illegible]

[

[



]

阳离子	$u^{\infty}\times10^8$/（$m^2\cdot s^{-1}\cdot V^{-1}$）	阴离子	$u^{\infty}\times10^8$/（$m^2\cdot s^{-1}\cdot V^{-1}$）
Li^+	4.07	HCO_3^-	4.61
Na^+	5.19	NO_3^-	7.40
Ca^{2+}	6.59	Cl^-	7.91
K^+	7.62	SO_4^{2-}	8.27

[illegible]

1. [illegible]

[illegible]**1**[illegible] [illegible] **-** [illegible] $- ne^{-} =$ [illegible]

[illegible] **+** [illegible] $+ ne^{-} =$ [illegible]

[illegible]**2**[illegible]

- [illegible]
- [illegible]
- [illegible]

2. □□□□

□1□Cu-C-$FeCl_3(aq)$

□2□Mg-Al-$NaOH(aq)$

□3□Cu-Fe-□HNO_3

□4□Al-C-$NaCl$□□□□□□

[illegible]

1 [illegible]

[illegible] Zn [illegible] H_2 [illegible]

——[illegible]

[illegible]． [illegible]

______________ ①③⑤

① [illegible]

② [illegible]

③ [illegible]

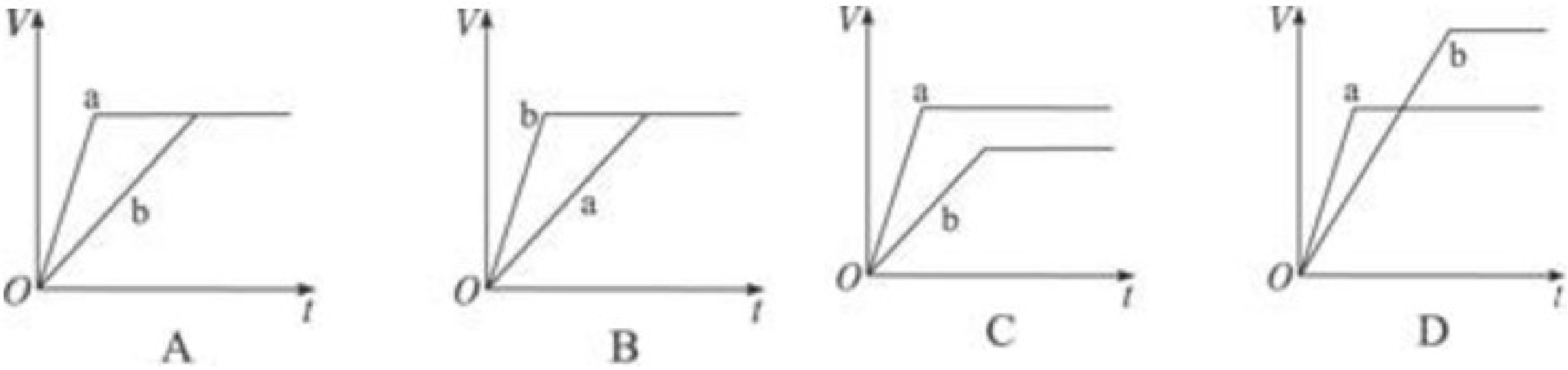
④ [illegible]

⑤ [illegible]

⑥ [illegible]

[illegible] . [illegible] a [illegible] b [illegible] a [illegible]
[illegible] $CuSO_4$ [illegible]
(V) [illegible] (t) [illegible] [illegible]

D



[illegible]

2. [illegible]

[illegible]

[illegible]

[illegible] A [illegible] B [illegible] A [illegible] A^2 [illegible] 2e [illegible] =A [illegible] B [illegible] 2e [illegible] =B^2 [illegible]

[illegible] A [illegible] B [illegible]

______ $A < B$ ______ [illegible]

3. [illegible]

[illegible]1[illegible]

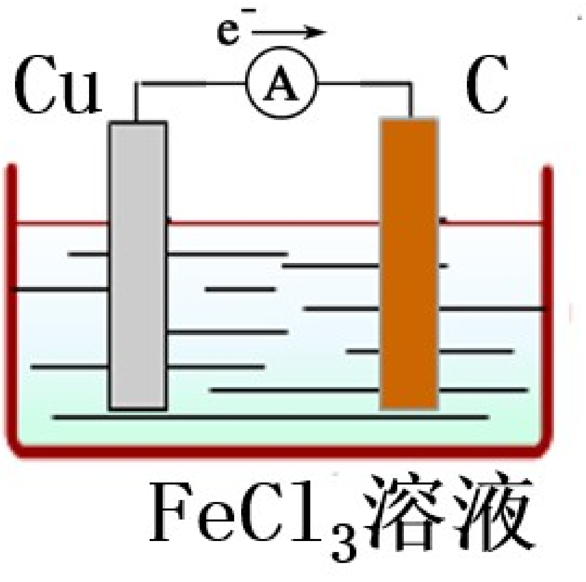
[illegible]

[illegible]—[illegible]—[illegible]

[illegible]2[illegible]

[illegible] $Cu + 2Fe^{3+} = 2Fe^{2+} + Cu^{2+}$

[illegible]



4. [illegible]

[illegible] 1 [illegible]

[illegible] $M - ne^{-} = M^{n+}$

[illegible]

[illegible]

[illegible]

[illegible]

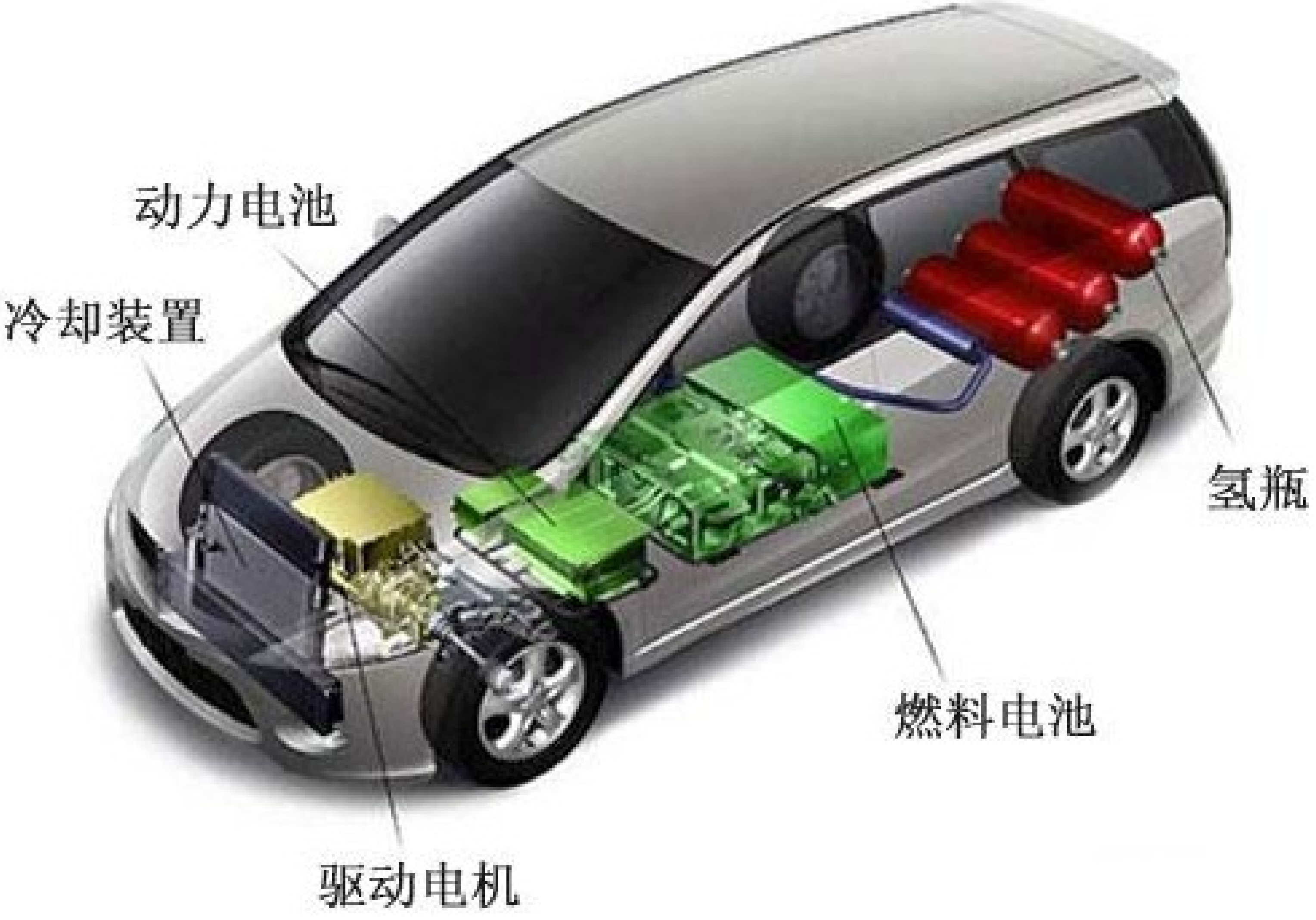
[illegible]

[illegible] 2 [illegible]

[illegible]

[illegible]

[illegible]


动力电池
冷却装置
氢瓶
燃料电池
驱动电机

系统透视图
锂离子电池
氢燃料储气罐
燃料电池反应堆
氢燃料模块
电动机
气压组件

[illegible]

[illegible]

[illegible] $Zn\text{-}MnO_2\text{-}KOH$

[illegible] $Zn + 2OH^- - 2e^- = Zn(OH)_2$

[illegible] $2MnO_2 + 2H_2O + 2e^- = 2MnOOH + 2OH^-$

[illegible] $+2MnO_2H_2O == 2MnOOH + Zn(OH)_2$

([illegible])

[illegible]: Zn-Ag_2O-KOH

[illegible]

[illegible] $Zn - 2e^- + 2OH^- = Zn(OH)_2$

[illegible] $Ag_2O + 2e^- + H_2O = 2Ag + 2OH^-$

$+ Ag_2O\ H_2O == Zn(OH)_2 + 2Ag$

[illegible]

□□□□□□□□□□□□□□□□□□□OH^-□□□□□□□□□□□□□□□□□□□Cu＋Ag_2O===CuO＋2Ag□□□□□□□□□□□ (　　)

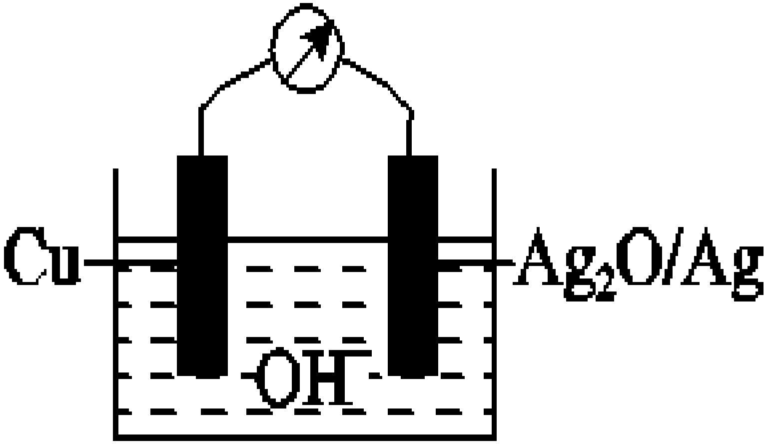
B

A □□□□□□□Cu□□□□□ $c(OH^-)$ □□

B □□□□□□□□□□□Ag_2O□□CuO

C □□□□□□□□□Ag_2O＋$2e^-$===2Ag＋O^{2-} D □□

□□□□□□□□□□□□ $c(OH^-)$



[illegible]

[illegible]① “[illegible]”[illegible]② [illegible]
③ [illegible]

[illegible] Li — I_2 [illegible]

2 Li [illegible] I_2 = 2 LiI [illegible] [illegible] [illegible] B

A [illegible] Li [illegible] e[illegible] = Li[illegible]

B [illegible] Li[illegible][illegible]

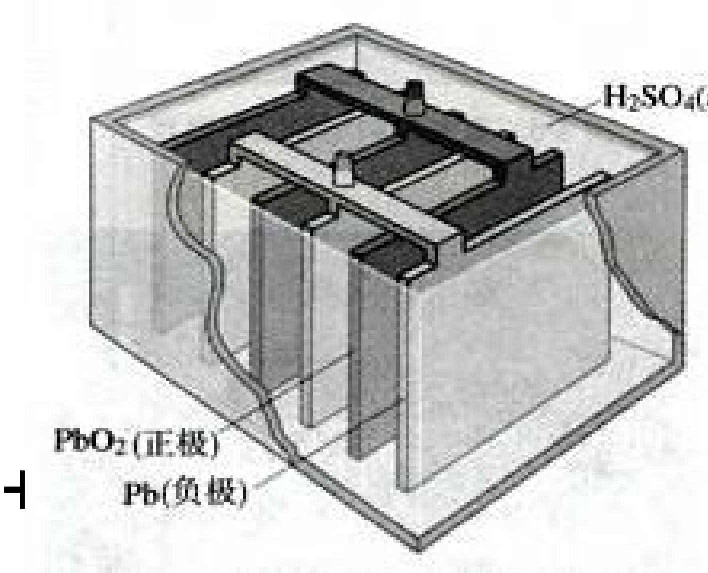
C [illegible]

D [illegible]

[illegible] ([illegible]) [illegible]

□□□□□□□□□□□□□□□□□□

□□□□□□□□□□……



□□□：$Pb-2e^{-}$ == □$PbSO_4$

□□□□□ $Pb+PbO_2$ + H_2SO_4

□□：$PbO_2+4H^{+}+2e^{-}$ ==$PbSO_4$+

□□□： $Pb+PbO_2+2H_2SO_4$==$2PbSO_4+2H_2O$

□□□$PbSO_4$ □□□□□□

$Pb+PbO_2+2H_2SO_4$ □□ → ← □□ $2PbSO_4+2H_2O$

□□□□□□□□□□□□□□□□□□

[illegible]．[illegible]

[illegible]“ +” [illegible]“—”[illegible]“ +” [illegible]

[illegible]( )

B

A [illegible]

B [illegible]

C [illegible]

D [illegible]

□□□□□□

1. □□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□ : $2H_2+O_2=2H_2O$

① □□□□□□□□□□□□□□□

□□□ $H_2 - 2e^- == 2H^+$

□□□ $O_2 + 4H^+ + 4e^- == 2H_2O$

② □□□□□□□□□□□□□□□

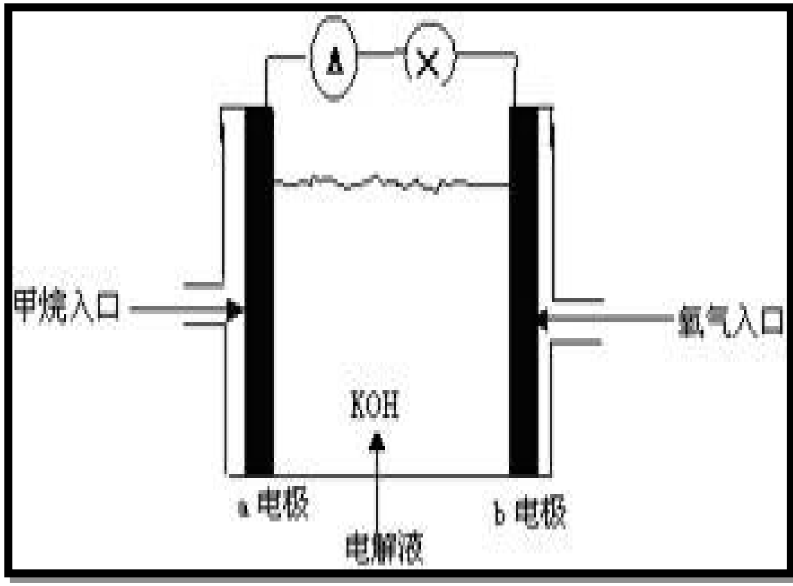
□□□ $H_2 + 2OH^- - 2e^- == 2H_2O$

□□□ $O_2 + 2H_2O + 4e^- == 4OH^-$

□□□□□□□
□□□□ **O_2(□□□
□□)**

2. □□□□□□

□□□ $CH_4 + 2O_2 == CO_2 + 2H_2O$



① □□□

□□□ $CH_4 + 2H_2O - 8e^- = 8H^+ + CO_2$

□□□ $O_2 + 4H^+ + 4e^- = 2H_2O$

□□□□ $CH_4 + 2O_2 = CO_2 + 2H_2O$

② □□□

$CH_4 + 2O_2 = CO_2 + 2H_2O$ □

□□□ $CH_4 + 10OH^- - 8e^- = CO_3^{2-} + 7H_2O$

$CO_2 + 2OH^- = CO_3^{2-} + H_2O$

□□□ $O_2 + 2H_2O + 4e^- = 4OH^-$

□□□□ $CH_4 + 2O_2 + 2OH^- == + 3H_2O$

3.([illegible] [illegible] [illegible] Y_2O_3 [illegible] ZrO_2 [illegible] O^{2-} [illegible]

[illegible]

A [illegible] O^{2-} [illegible] B

B [illegible] $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ C

C [illegible]

$O_2 + 4e^- = 2O^{2-}$

D [illegible]

$C_4H_{10} + 26e^- + 13O_2 = 4CO_2 + 5H_2O$

[illegible] $C_4H_{10} - 26e^- + 13O^{2-} = 4CO_2 + 5H_2O$

4.([illegible]) [illegible]

Li_2CO_3 [illegible] Na_2CO_3 [illegible] CO [illegible]

[illegible] CO_2 [illegible] 650℃ [illegible]

[illegible]

[illegible] ______ **$CO+CO_3^{2-}-2e^- = 2CO_2$** ______;

[illegible] ______ $O_2+2CO_2+4e^- = 2CO_3^{2-}$ ______ [illegible]

[illegible] ______ $2CO+O_2 = 2CO_2$ ______ [illegible]

□□□□ NO_2 □ O_2 □□□□ $NaNO_3$ □□□□□□□□□□□□□□□□□□

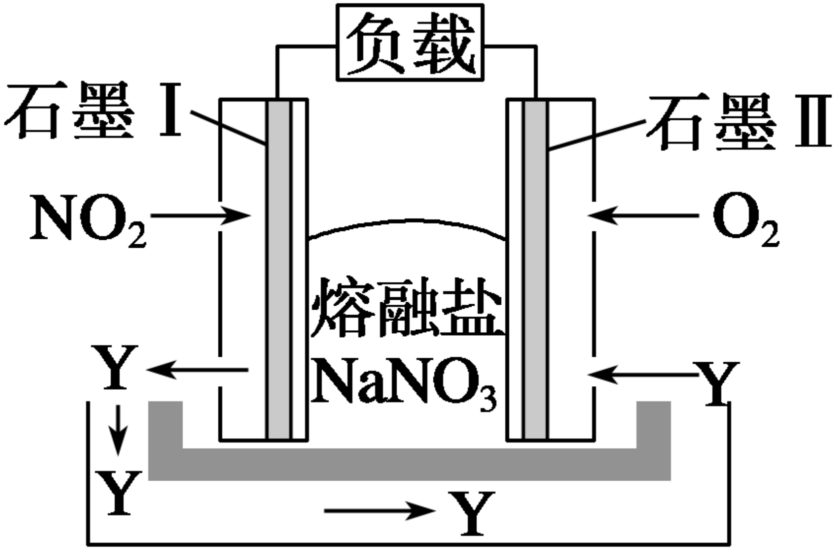
□□□I□□□□□□□□□□□Y□□□□□□□□□□□（　　）

A. □□I□□□□□□□II□□□□　C

B.Y □□□□□□□ NO

C. □□I□□□□□□□□ NO_2 □ $NO_3^{□}$□e$^{□}$ ＝ N_2O_5

D. □□II□□□□□□□□



5. ,

H^+

60℃-80℃

85%——90%

[illegible]. [illegible]

[illegible]（ ）

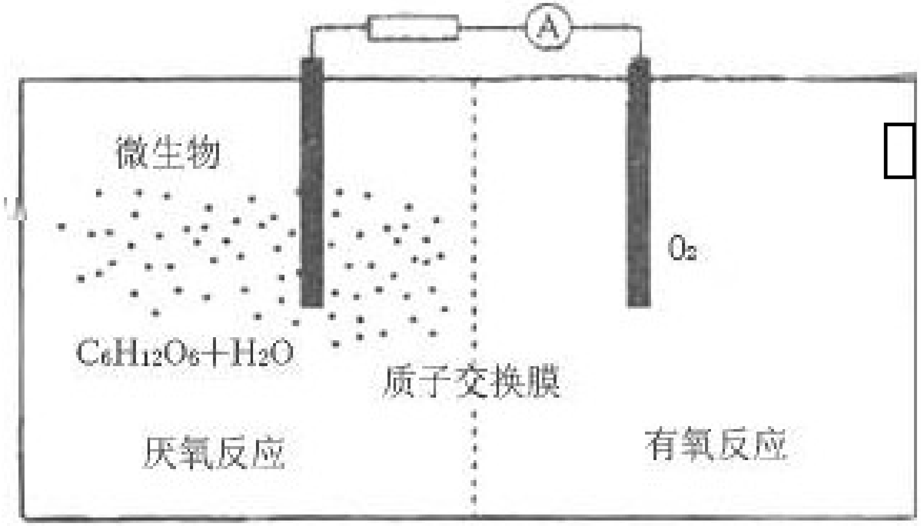
A

A [illegible] CO_2 [illegible]

B [illegible]

C [illegible]

D [illegible] $C_6H_{12}O_6+6O_2 \rightarrow 6CO_2+6H_2O$



[illegible] **$O_2+4H^+ +4e^- == 2H_2O$**

[illegible]

$C_6H_{12}O_6-24e^-+6H_2O = 6CO_2+24H^+$

[illegible] O_2 [illegible]

[illegible]	[illegible]
[illegible]	$0_2+4H^+ +4e^- == 2H_20$
[illegible]	$0_2 + 2H_20 + 4e^- == 40H^-$
[illegible]	$O_2 + 4e^- = 2O^{2-}$
[illegible]	$O_2+2CO_2+4e^- =2CO_3^{2-}$
[illegible]	$0_2+4H^+ +4e^- == 2H_20$

[illegible] CH_4 [illegible]

□2018 □□ II □□ 12 □□□□□□□□□□□□“□□□”□ Na—CO_2 □□□□□□ $NaClO_4$ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ $3CO_2+4Na \rightleftharpoons 2Na_2CO_3+C$ □□□□□□□□□□ □

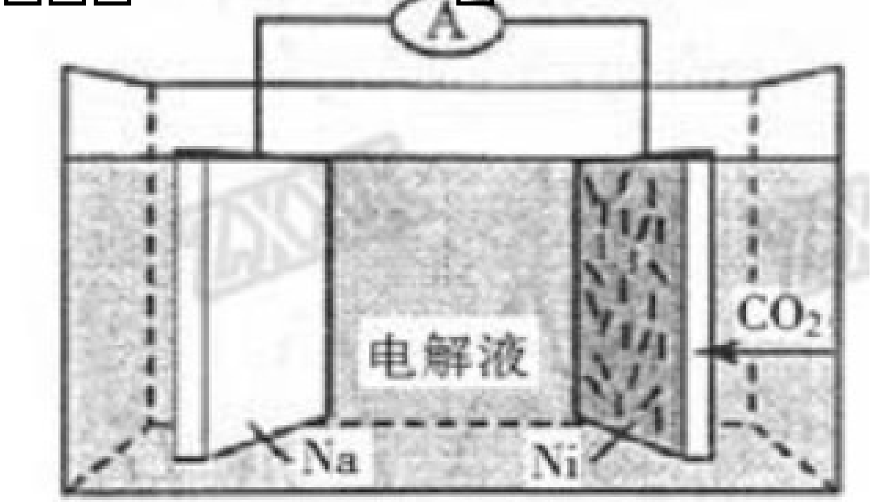
D

A. □□□□ $ClO_4^{□}$□□□□□

B. □□□□□ CO_2 □□□□□ CO_2

C. □□□□□□□□□□□□□ $3CO_2+4e^- □ 2CO_3^{2□}+C$

D. □□□□□□□□□□□□□ $Na^++e^- □ Na$



□2020 □□ III □□ 12 □

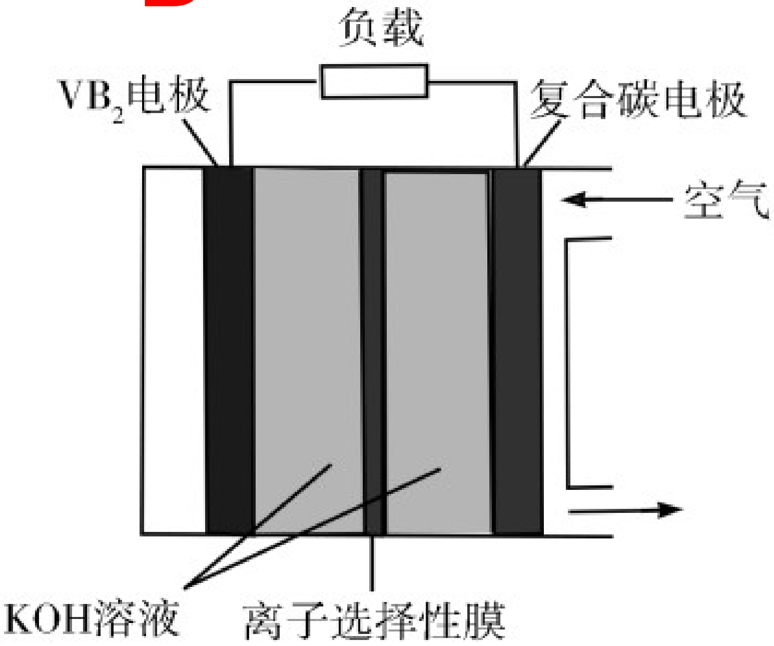
□□□□□□□□□□□□ VB_2 □—□□□□□□□□□□□□ VB_2 □□□□□□

$$VB_2 + 16OH^- - 11e^- = VO_4^{3-} + 2B(OH)_4^- + 4H_2O$$

□

□□□□□□□□□□□□□□□ □

B



A □□□□□ 0.04 mol □□□□

□ 0.224 L □□□□□□ O_2 □□□□

B □□□□□□□□ pH □□□□□

□□□ pH □□

C □□□□□□□□□

$$4VB_2 + 11O_2 + 20OH^- + 6H_2O = 8B(OH)_4^- + 4VO_4^{3-}$$

D □□□□□□□□□□□□□□□□□□ VB_2 □□□ KOH

□□□□□□□□□□

[illegible]

① Cu-C-$FeCl_3$

② Mg-Al-$NaOH$

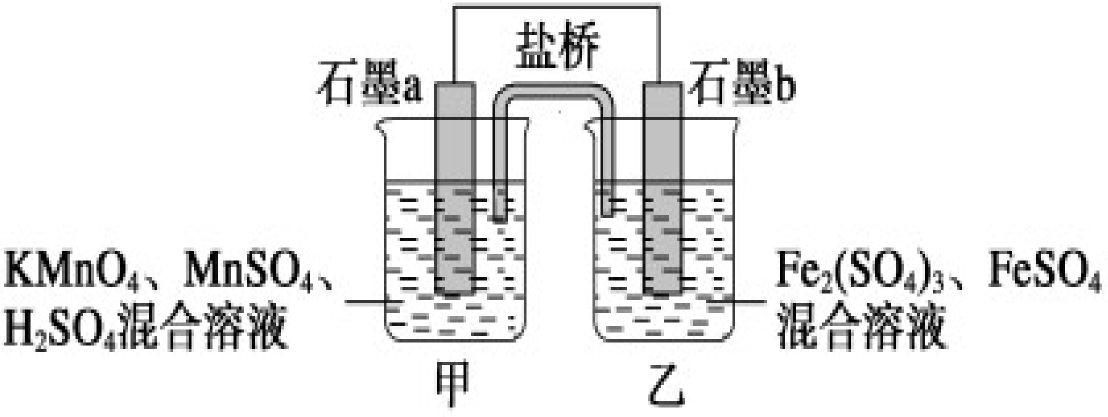
③ [illegible]

④ [illegible] Pb-PbO_2-[illegible]H_2SO_4

⑤ [illegible]

([illegible])

□□ 1 □□□□□□□□□□□□□□□ $2KMnO_4$ □ $10FeSO_4$ □ $8H_2SO_4=2MnSO_4$ □ $5Fe_2(SO_4)_3$ □ K_2SO_4 □ $8H_2O$ □□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□ 1 $mol·L^{□1}$ □□□□□□ □□ 200 mL □□□□□□□□ K_2SO_4 □□□



□□□□□□

(1) □□□□□□□□□

____a____(a □ b)

(2) □□□□□□□□□

$SO_4^{2□}$□□ ____□____ (□“□”□“□”) □□□

(3) □□□□□□□□□□□

$MnO_4^- + 5e^- + 8H^+ == Mn^{2+} + 4H_2O$ □

(4) □□□□□□□□□□□ $MnSO_4$ □□□□ 1.5 $mol·L^{□1}$ □□□□□□□

□□□ ____0.5____ mol □

① Cu-C-$FeCl_3$

□□□ $Cu - 2e^- = Cu^{2+}$

□□: $2Fe^{3+} + 2e^- = 2Fe^{2+}$

□□□□ $Cu + 2Fe^{3+} = 2Fe^{2+} + Cu^{2+}$

② Mg-Al-NaOH

□□□ $2Al - 6e^- + 8OH^- = 2AlO_2^- + 4H_2O$

□□: $6H_2O + 6e^- = 3H_2\uparrow + 6OH^-$

□□□□ $2Al + 2OH^- + 2H_2O = 2AlO_2^- + 3H$

③ □□□□□□

(□□□□□□)

□□□ $2Fe - 4e^- = 2Fe^{2+}$

□□□ $O_2 + 4e^- + 2H_2O = 4OH^-$

$+ O_2\ H_2O == 2Fe(OH)_2$

[illegible][illegible] $:2H_2+O_2=2H_2O$

① [illegible]

[illegible] $2H_2–4e^- =4H^+$

[illegible] $O_2+4H^+ +4e^- =2H_2O$

② [illegible]

[illegible] $2H_2 +4OH^-–4e^- = 4H_2O$

[illegible] $O_2 +2H_2O +4e^- = 4OH^-$

[illegible]:

① [illegible] [illegible] $CH_4+2H_2O–8e^- == 8H^+ +CO_2$

[illegible] $2O_2+8H^+ +8e^- == 4H_2O$

[illegible] $CH_4+2O_2 == CO_2 + 2H_2O$

② [illegible] [illegible] $CH_4+ 10OH^-–8e^- == CO_3^{2-}+7H_2O$

[illegible] $2O_2+ 4H_2O + 8e^- == 8OH^-$

[illegible] $CH_4 + 2O_2 + 2OH^- == +3H_2O$

[illegible]

① [illegible]　[illegible] $C_2H_5OH + 3H_2O - 12e^- == 12H^+ + 2CO_2$

[illegible] $3O_2 + 12H^+ + 12e^- == 6H_2O$

[illegible] $C_2H_5OH + 3O_2 ==$
$2CO_2 + 3H_2O$

② [illegible] [illegible] $C_2H_5OH + 16OH^- - 12e^- == 2CO_3^{2-} + 5H_2O$

[illegible] $3O_2 + 6H_2O + 12e^- == 12OH^-$

[illegible] $C_2H_5OH + 3O_2 + 4OH^- == 2 + 5H_2O$